CAUSES OF BLINDNESS IN PENNSYLVANIA

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4. From past experience substantiated by the results of this series, one negative cholecystographic response is not an indication for immediate operative intervention even in the presence of gallbladder symptoms. I believe that more than one negative radiographic examination is necessary before the patient should be subjected to surgery. The presence of gallstones is probably the most important indication at this time for surgical intervention. Cholecystography after a gallbladder regimen will often clarify this important query.

1439 South Michigan Avenue.

CAUSES OF BLINDNESS IN PENNSYLVANIA

FROM THE MEDICAL AND SOCIAL ASPECTS

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Unfortunately, in the various state acts relating to blind persons there is such a wide variation in the definition of blindness and in the procedure by which the blindness of an individual is determined that it has been extremely difficult, if not impossible, to gather together data of such a nature that they can be studied on the basis of any uniform standard.

In an effort to overcome this difficulty and to establish a uniform definition of blindness and classification of the causes of blindness, there was organized some years ago a Committee on Statistics, a body composed of representatives of the American Foundation for the Blind, the National Society for the Prevention of Blindness, the American Association of Workers for the Blind and the Statistical Committee of the Section on Ophthalmology of the American Medical Association. Out of the deliberations of this committee have come certain recommendations and suggestions which, if generally adopted, will give a uniformity of statistics on blindness that has not heretofore been available.

The enactment of legislation in Pennsylvania for blind relief, very shortly after the recommendations of the Committee on Uniform Statistics had been made public, presented an opportunity for putting these recommendations into effect on a large scale.

The Pennsylvania blind relief law, while conforming in many respects to similar laws in other states, differs from all the others on three major points—the method of its administration, the procedure to be followed in determining the causes of blindness and the definition of blindness.

In Pennsylvania there has been for more than twenty years an established organization for the administration of the Mother's Assistance Fund, known in some states as Widow's Aid. This fund is administered by county boards of trustees who serve without pay. It is supervised by the parent organization in the state welfare department. Social welfare programs are carried on by qualified, paid workers. When acts were passed for relief for the blind and for assistance to the aged, it was wisely provided that responsibility for their administration should also be placed in the hands of these already efficiently functioning boards. This method of administration has served as a model for many other public health and social welfare programs in Pennsylvania and other states.

The method decentralizes relief and brings blind recipients in close touch with the agents of the state who distribute the grants. It makes possible certain other social services, services that a small pension cannot provide but which most individuals and their families need. The person who needs teaching or is employable is brought to the attention of the agency skilled in teaching the blind or to employment officers, who are often able to find work for the capable. Health problems of the pensioner and his family are referred to the family physician, if there is one, and otherwise to the organization best equipped to deal with them. But probably the most valuable factor in administering relief through the Mother's Assistant Fund is the opportunity it affords to protect family contacts against unnecessary eye hazards. Social workers taught to organize a sound social hygiene program and trained to recognize deviations from the normal eye conditions can secure for their wards the medical care and continued treatment which are often the sole means of preventing blindness.

The regulations of the act require every applicant to submit himself to an accredited ophthalmologist for examination and they further provide that the ophthalmologic reports pass through the hands of a supervising ophthalmologist attached to the staff of the department of welfare. This makes possible a uniformity of judgment and diagnoses which can be secured in no other way. Of all the other states having blind relief laws, Missouri alone provides for a similar procedure.

These provisions have made available for study and analysis what is probably the largest single series of reasonably descriptive reports of blind eyes up to the present time. It is estimated that they represent about 50 per cent of all the blind in the state, and from the data contained there can be deduced, with a fair degree of accuracy, the relative percentages of the various ophthalmic diseases which are the sole or main contributing cause of blindness; the underlying etiologic factors; the distribution of the blind throughout the state, and the predominance of the various causes and their relation to the prevailing occupations in the locality found; the relation of prevalence of blindness in certain localities to accessibility to competent medical assistance; blindness due to ignorance, carelessness or poverty; blindness due to traumatism; accidents to the good eye of one-eyed persons; heredity, and so on. While we intend to elicit eventually much information of value from both the medical and the social aspects, the present communication is limited to a more or less general survey and classification of the various causes of blindness.

At the outset it is only fair to state that the final analysis must be faulty to a certain extent. It should be considered that the applicants, in most instances, submitted themselves for examination long after all activity of the primary disease had subsided—in the majority of cases many years after—and sometimes with one or two empty sockets. The examining physician seeing a person for the first time, with no case record of the disease before him, is compelled to base his diagnosis on the appearance of the eye at the time of examination and to the frequently faulty history by the patient himself. It should be considered also that much of the substance of the reports necessarily depends on the

Valuable help was rendered by Mrs. Bernice English, of the Council for the Blind, State of Pennsylvania.
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answers of elderly, ignorant or otherwise unreliable patients, or even intelligent ones with a tendency to distort facts.

The reviewer, with or without reason, was often made to feel that the given diagnosis was not always correct and this because of no fault of the examiner. For example, such diagnoses as congenital microphthalmus or congenitally undeveloped globes might easily be the sequelae of ophthalmia neonatorum. One report, illustrating the extreme difficulty of eliciting information from the patient, stated "Eye enucleated. No injury. Pathology not known." Many other examples might be mentioned. The primary disease given was

TABLE 1.—*Causes of Blindness*

Congenital Anomalies	
Glaucoma	53
Defective globes	197
Albinism	10
Anophthalmos	10
Neuroretinitis	2
Coloboma of choroid	2
Cataract	229
Optic atrophy	29
Coloboma of optic nerve head	2
Total (4.5%)	534
Traumatism	
Penetrating wound of globe	989
Uveitis	91
Sympathetic ophthalmia	232
Keratitis	72
Insect bite	4
Burns	149
Hemorrhage into vitreous	8
Rupture of choroid	5
Cataracts	66
Detachment of retina	26
Optic atrophy	91
Optic tracts and centers	4
Neuroretinitis	17
Total (14.68%)	1,754
Lids	
Carcinoma of lids	2
Conjunctiva	
Ophthalmia neonatorum (3.9%)	470
Purulent conjunctivitis	71
Gonorrheal conjunctivitis	17
Diphtheritic conjunctivitis	2
Trachoma	64
Photophthalmia	4
Pemphigus	12
Pterygium	10
Total	650
Globe	
Glaucoma, chronic	1,465
Glaucoma, acute	116
Total (13.34%)	1,581
Glaucoma, juvenile	8
Tumors	4
Cornea	
Keratitis, interstitial (1%)	124
Keratitis, ulcerative	194
Keratitis, undetermined	12
Keratitis, exposure	2
Keratitis, marginal	1
Corneal dystrophy	12
Keratoconus	8
Keratomalacia	2
Uvea	
Uveitis (12.63%)	1,496
Choroiditis, atrophic (4%)	480
Choroiditis, suppurative	5
Lens	
Cataract, senile (22.49%)	2,666
Cataract, juvenile	22
Cataract, diabetic	4
Cataract, endocrine	6
Retina	
Retinitis, vascular	244
Retinitis, diabetic	82
Retinitis, nephritic	43
Retinitis, pigmentosa	236
Retinitis, leukemic	2
Detachment of retina	82
Senile macular degeneration	21
Total	710
Vitreous	
Hemorrhage into vitreous	13
Abscess of vitreous	2
Optic Nerve	
Optic atrophy, simple (10.1%)	1,202
Papilledema	60
Neuroretinitis	293
Miscellaneous	
Amaurosis	4
Nystagmus	2
Total	6
Total	11,852

often, therefore, mere conjecture and it is fortunate that the act makes it a requirement that the examining physician must be an accredited ophthalmologist, one whose opinion is of value.

While the causes of blindness as given in the series as a whole are reasonably reliable, the same cannot be said with regard to the underlying etiologic factors, which are given in table 1. Even with all our modern facilities, an underlying etiologic factor often cannot be found, much less in these examinations, in which it was almost always necessary to obtain the information from the applicant himself. Every clinician knows how a patient will associate one disease with another or with some accident which might or might not be material. The supervising examiner has taken the liberty of rejecting a number of given etiologic factors such as when, for example, influenza, eyestrain or diseased tonsils was given as the cause of senile cataract. It could be plainly seen that often an examiner had thoughtlessly jotted down the patient's statement. But whenever a reasonable underlying cause was given it was accepted as positive, even though the examiner himself had expressed a doubt.

The tabulation is of the eyes of those who, with visual acuity of less than 3/60 or 10/200 with both eyes, were defined as blind persons according to the original act. In the last act, approved July 9, 1935, one with visual acuity of 3/60 or 10/200 or less was defined as a blind person.

In order to serve the purpose of this report best and to avoid overlapping, one diagnosis only, the primary disease which was considered to be the main cause of blindness, was chosen from the data. Complications, sequelae and secondary disorders are not mentioned. Also, because in so many instances the cause of blindness was found to differ in the two eyes of one individual, eyes and not persons are enumerated.

In arranging the various diseases into the twelve groups comprising the present classification, some explanation is in order. The compilation of such a large number of reports by so many physicians made it necessary, of course, to condense terms and to modify them to a considerable extent in many instances.

Those cases of congenital anomalies the report of which indicates more than one disease entity are grouped under "defective globes." These include also such notations as underdevelopment or malformations. Classified under penetrating wound of the globe are included not only those reported as penetrating wounds but also intra-ocular foreign bodies, adherent leukoma, gunshot wounds, eyes lost in explosions, and other injuries vaguely described but resulting in the loss of an eye.

Such diagnoses as iritis, iridocyclitis, kerato-iritis, plastic iritis, cyclitis and complicated cataract are placed under the heading of uveitis. This group includes all disorders of the uveal tract except when there was a definite diagnosis of choroiditis or the description warranted; but even some of these are grouped under uveitis if, in addition, there were other changes noted such as complicated cataracts. Chorioretinitis, retinochoroiditis and chorioretinal atrophy are all grouped under choroiditis.

It is considered permissible to include among senile cataracts all those diagnosed as diabetic in which the lenses became opaque after the age of 50 years, although a notation is made of the associated diabetes. Needless to state, in numerous instances in which the cause of blindness is given as senile cataract there was a previously existing retrolenticular condition that could not be determined. This can be inferred from the numerous absolutely blind persons with senile cataract.

All nontraumatic intra-ocular lesions due primarily to vascular disease such as hemorrhages and exudates in the retina, embolism, thrombosis, proliferans, angiosclerosis and so on, are included under vascular retinitis.

All those diagnoses such as retinochoroiditis, chorioretinitis and optic neuritis which resulted in optic atrophy, and also those cases which were designated as secondary optic atrophy or optic neuritis without notation of any other lesions, are classified as neuroretinitis.

It will be seen that the most frequent cause of blindness in this tabulation is senile cataract, 22.49 per cent. Of the total number of these eyes, 2,666, 1,927 were

not operated on for various reasons—through neglect, unwillingness or other reasons on the part of the patient, or because of poor operative risk. The remainder, 706 eyes, were failures, either because of postoperative complications or of some previously existing retrolental lesion. This is certainly a small proportion of the great number of cataract operations performed.

Traumatism is next in importance as a cause of blindness, 14.68 per cent. This percentage of blindness due to trauma is no indication of the great number of individual eyes lost through accident. For the past fifteen years approximately 450 eyes each year have been lost by industrial accidents and in no year has there been more than twenty double eye accidents.

Glaucoma of the adult type occurred in 13.34 per cent of all cases. Of the total number, 768 were operated on, at least 120 received inadequate treatment, as indicated in the reports, and 204 received no treatment whatever.

Uveitis, with a percentage of 12.63, is extremely high when it is considered that choroiditis and the traumatic and postoperative disorders of the uvea are not included in this group.

Simple optic atrophy ranks next, with about 10 per cent of the total.

TABLE 2.—*Given Etiologic Factors, Other Than Traumatism, Senility and Congenital Anomalies*

Gonorrhea	17	Scarlet fever	50
Malnutrition	2	Tuberculosis	20
Tetany	3	Unknown organisms	71
Endocrine disease	5	Diabetes	94
Leukemia	2	Purpura haemorrhagica	2
Syphilis	566	Black fever	2
Myopia	272	Disseminated sclerosis	6
Diphtheria	8	Hydrocephalus	10
Pneumonia	4	Infantile paralysis	2
Streptococci	2	Pituitary disease	12
Meningitis	72	Cardiovascular disease	270
Whooping cough	12	Nephritis	53
Focal infections	26	Paget's disease	2
Carbuncle	2	Toxemia	72
Measles	28	Erysipelas	2
Arthritis	8	Brain tumor	108
Pregnancy	14	Other tumors	4
Sinusitis	4	Typhoid	14
Influenza	41	Consanguinity	2
Smallpox	8	Encephalitis	6

The percentage of ophthalmia neonatorum, 3.9, ranks lower than congenital anomalies, with 4.48 per cent.

In general it will not be possible to apply these causes of blindness universally throughout the United States. This can readily be understood from the wide variation in causes of blindness and the percentages, when the total figures for the whole state are broken down into counties. These differences appear to bear a distinct relationship to the industries predominant in the community, the racial and other characteristics of the population, the facilities for adequate care and the general understanding of the need for such care in the early stages of any eye disease. For instance, through those sections of Pennsylvania in which mining is the predominant industry, a high percentage of the blind population have lost their sight as a result of explosion accidents which have at one time destroyed both eyes. In certain other areas which are extremely rural and in which there is little or nothing in the way of specialized medical service, large percentages of the blind have lost their sight from causes which would or might have yielded to prompt treatment in the early stages, and also such conditions that could have been corrected by operation. Again, such diseases as trachoma, which is the most common cause of blindness in certain states, is extremely rare as a cause of blindness in Pennsylvania.

Table 2 must be considered of questionable value both from the standpoint of the actual underlying etiologic factor as has been explained, and also with regard to the number. For example, probably most of the 470 cases of ophthalmia neonatorum were gonococcic infections, yet gonorrhea is given as the underlying cause of the loss of only seventeen eyes. The same may be said of syphilis with relation to interstitial keratitis. On the other hand, the numbers seventy-two, fifty and forty-one for meningitis, scarlet fever and influenza, respectively, are undoubtedly exaggerations.

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ABSTRACT OF DISCUSSION

DR. E. V. L. BROWN, Chicago: The payment of goodly sums of money to the blind in the shape of pensions has again added to our knowledge of conditions which cause blindness, this time in an industrial and mining state, Pennsylvania. The only previous highly valuable report was from an agricultural state, Missouri. The unusual significance of these two reports is due to the fact that the laws in these states require an examination of the eyes by an accredited eye doctor. Three other states, namely, Colorado, Idaho and Oklahoma, and the District of Columbia now require examination by an eye doctor, but no reports concerning the causes of blindness found in these states have appeared, so far as I can learn. In Pennsylvania the information obtained by the local eye doctor is passed on by a state supervising examiner, at present Dr. Cowan. Dr. Cowan has wisely edited, i. e., interpreted, the reports thus furnished him and arranged and classified them according to diseases and etiologic factors. He estimates that the report covers about half of the actual number of blind in the state. If the roughly 12,000 eyes thus reported on come from 6,000 individuals, this would make around 12,000 blind in the state. This 12,000 figure, when put alongside the 1930 federal census figure of 4,373 blind in Pennsylvania, demonstrates how effective a money inducement is in bringing out an otherwise undisclosed condition. The Missouri law did much the same thing. In these increasingly accurate statistics, some well known and some heretofore less well determined facts stand out. For instance, senile cataract was the diagnosis in 22 per cent of those who became blind in Pennsylvania. Trauma caused 15 per cent of the blindness. Seventeen per cent for uveal disease is surprisingly high. Four per cent for ophthalmia neonatorum shows what advance prevention work is making. Glaucoma rates high with 13 per cent; congenital anomalies run 5 per cent. Dr. Cowan first excludes trauma and congenital anomalies. He then excludes "senility" as a cause but does not state just what he means by senility as a cause of blindness. This might well include the 22.5 per cent caused by senile cataract, and then the three—trauma, congenital anomalies and senile cataract—would add up to 42 per cent. However, the long list of forty other etiologic factors determinable applies to only 1,898, or 16 per cent of the 11,852. This 16 per cent with known etiology, plus the 42 per cent excluded with known etiology, makes 58 per cent in which the cause of blindness in Pennsylvania may be considered to be known. But there are an equal number in the state who are not pensioned. We are therefore confronted with the startling fact that, in what is undoubtedly the best report our country has so far been able to produce, with a very large number of eyes, 12,000, all examined by eye doctors, one of the older states of the country has to admit that the cause of blindness is unknown in nearly three fourths of the cases. It is highly desirable, first, that other states follow and that more reports on the diseases in these eyes and the causes be made.

DR. WILLIAM H. CRISP, Denver: The problem of furnishing financial and other help for the blind is by no means simple. The need for a definition of blindness arises largely out of the need for a standard on which to base the assignment of charity to those who because of loss of sight are prevented from gaining their livelihood. The standard of blindness, from

the economic point of view, is actually bound to vary with the individual case. A former patient of mine with vision of about 20/240, or less than 10 per cent of normal, was successful in profitably raising young plants that were bought by the farmers in his neighborhood. Yet another man with better vision than this will be quite unable to earn a living. Technically, my old gardener had 100 per cent loss of industrial vision as measured by the standard adopted by the industrial commission of the state of Colorado. The patient's mental and moral equipment play an extremely important part in the problem, and the kind of work he attempts to do and to which his mentality can adapt itself is also extremely important. In some telephone services there are very efficient blind operators engaged in special services. The rules for provision of pensions to the blind, of course, make allowance for this phase of the problem. Statistics have been multiplied seemingly without end. Yet often the information afforded is far from reliable. Statistics are useful only as a basis for future action. Information about the blind in Pennsylvania is useful, as indicated by Dr. Cowan, as a basis for provision of various social services to the blind, including care of their general health, facilities for education and training, and opportunities for employment. Statistics have also an educational and prophylactic value in dealing with the general public. Unfortunately, some unreliable features of the information obtainable can never be altogether remedied because of remoteness of the time when loss of vision occurred, lack of technical records, and often inaccuracy in technical records because of carelessness or ignorance on the part of the general physician. Some causes of blindness seem rather hopelessly beyond control. Among these is the miscalculated dynamite explosion, from which so many of Dr. Cowan's miners lost both eyes. The attempt to remedy the condition of these patients is usually very discouraging, but it is often worth making if some sight remains in at least one eye.

DR. CONRAD BERENS, New York: Dr. Cowan should be congratulated on his careful study of 6,000 cases, which is almost double the number we reported on before this section last year. The group studied by our Committee on Statistics of the Blind is a fairly accurate cross section of students in schools for the blind in the United States. Our observations agree quite closely in certain respects with Dr. Cowan's statistics. Our figures in regard to the hereditary and congenital causes of blindness are naturally much higher (51 per cent) because our studies were concerned principally with young children. These studies clearly indicate the need for treating this group with greater intelligence. More thorough examinations and more carefully prepared records of the initial examinations of these cases will aid materially in obtaining the necessary statistical data regarding etiology. Possibly the examination and treatment of these cases are better organized and more thorough in Pennsylvania than they are in many other states, for Dr. Cowan's statistics do not show quite so clearly, as do the national statistics, the great need for improved methods in diagnosis and treatment. We found many children in these schools for the blind who should never have been admitted and many who could have been released had they received proper treatment. On behalf of the Committee on Statistics of the Blind, I again urge the continued cooperation of every ophthalmologist in this work. Initial examinations must be more thorough and records more complete if the data which our committee is assembling are to be valuable in directing programs for the prevention of blindness and for research in the etiology of diseases that result in blindness. Additional studies similar to those made by Dr. Cowan and by our committee are needed to maintain interest in these problems.

DR. ALFRED COWAN, Philadelphia: What I have said is the result of analysis of the data collected in the first year after the enactment of the law. There are twice this number of reports to consider by now. This first report lacks a certain value for this reason: When the law was enacted and administration begun, there came at once a group of applicants for pensions, composed of persons who had been blind for a number of years, up to seventy, eighty and ninety. Data of this kind, of course, are not nearly so valuable as they will be in the future years. In the future the reports of more recently blinded persons will be available. I do not think that the etiologic factors given here are of much value. The causes given are those recorded on the reports by the examining physicians. In many of these cases senile cataract was given as the diagnosis, when I know for a certainty, without having the privilege of writing it down, that there were some other conditions long before the cataract developed. Under a law in which the examiner is an accredited ophthalmologist, we shall have real data. This was to be a model law, and in the first draft it was required that the ophthalmologist be certificated by the board of ophthalmic examiners. That is in the act, but there was added "or one legally allowed to practice ophthalmology." In other words, they just emasculated that part of the act which we should like to retain as a qualification for the man who makes the examination. I think it would be fine if something could be done in that respect in future acts.

CINCHOPHEN—IS THERE A SAFE METHOD OF ADMINISTRATION?

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AND
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In this paper we shall attempt to answer the question "Can cinchophen be given safely if given carefully?" The question itself implies that cinchophen is a dangerous drug.

Cinchophen, phenylcinchoninic acid, seems to have been discovered in 1887 by Doebner and Gieseke [1] and to have been introduced into medicine under the trade name of atophan in 1908 by Nicolaier and Dohrn.[2] Since that time it has been used extensively for gout as well as for other forms of arthritis and for the relief of pain of all types. In 1932 Hench [3] listed thirty-two drugs known to contain cinchophen or its derivatives as the active constituent and stated that he had accumulated the names of 500 remedies advertised in American drug lists as cures for rheumatism or as uric acid solvents, many of which undoubtedly possess cinchophen as the base. It has been estimated by White [4] that the annual consumption of cinchophen and its derivatives in the United States is about 90,000 pounds.

No serious effects were noted from cinchophen until 1913, when Phillips [5] described certain skin reactions as indicative of an idiosyncrasy to the drug. In 1922 Schroeder [6] called further attention to its toxic effects. The first case of jaundice attributed to cinchophen was reported in 1923 by Worster-Drought [7] and the first fatal case with jaundice two years later by Richard Cabot.[8] In the decade that has elapsed, an increasing

From the Department of Medicine, University of Chicago.
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Owing to lack of space, this article has been abbreviated in THE JOURNAL by the omission of a tabulation of all published and unpublished cases of cinchophen poisoning that the authors were able to find to date. The complete paper will appear in the authors' reprints.

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